ROCKS and MINERALS

A Magazine for Mineralogist, Geologist and Collector . . .

. . . . *Official Journal of The Rocks and Minerals Association*

SEPTEMBER, 1938

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THE ROCKS AND MINERALS ASSOCIATION

PEEKSKILL, N. Y.

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Organized in 1928 for the increase and dissemination of mineralogic knowledge.

To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

Those of our readers who are members of the Association can rightly feel that they too were sponsors of these many achievements that have helped to give mineralogy a national recognition. Among your friends there must be many who would like to have a part in the Association's work—to share with you the personal satisfaction, the pleasure, and the benefits of membership. Will you give your friends this opportunity to join the Association by nominating them for membership?

Each new member helps to extend the Association's activities—helps to make your magazine larger,better, and more interesting, and above all assists in the dissemination of mineralogical knowledge.

Some advantages of membership: All members in good standing receive:

(1) **Rocks and Minerals,** a monthly magazine. (2) A member's identification card that secures the privileges of many mines, quarries, clubs, societies, museums, libraries. (3) The right to participate in outings and meetings arranged by the Association. (4) The right to display a certificate of membership and to place after their names a designation indicating their membership or to advertise membership on stationary, etc. (5) The distinction and the endorsement which comes from membership in the world's largest mineralogical society.

Mineralogical clubs which subscribe for **Rocks and Minerals** also become affiliated members of the Rocks and Mineral Association and enjoy all the advantages which such an affiliation affords.

A number of clubs hold membership in the Association, participate in the annual outings, and co-operate in many ways in furthering the aims and ambitions of the Association.

Affiliation with the world's largest mineralogical society cannot fail to increase membership, enlarge circles of acquaintanceship, and stimulate a keener interest in mineralogy.

A list of affiliated clubs will be found among the back pages of the magazine.

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

SEPTEMBER 1938

CONTENTS FOR SEPTEMBER, 1938

CHIPS FROM THE QUARRY (Editorial Page) 258

COLLECTING MINERALS IN SOUTHWESTERN OHIO. By Herman Wuestner 259

AN ONYX MARBLE QUARRY NEAR PLATTEVILLE, WISCONSIN... 268

ROCKS AND MINERALS OF KANSAS. By A. C. Carpenter......... 269

TECTITES, A GEOLOGICAL MYSTERY 271

PHILADELPHIA ACADEMY OF NATURAL SCIENCES INSTALLS NEW FLUORESCENT EXHIBIT.......................... 272

TWO MINERAL LOCALITIES IN NEW MEXICO. By Tom Tarr..... 275

PRIZE ARTICLE CONTEST 276

BIBLIOGRAPHICAL NOTES:

Quartz Family Minerals 277

Mineral Tables 277

A Report on the Geology of the Patapsco State Park of Maryland 280

THE AMATEUR LAPIDARY: The Art of the Lapidary. Part 2...... 278

MINERALOGICAL CLUB OF HARTFORD VISITS A MARBLE QUARRY IN VERMONT 280

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ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

PETER ZODAC

A Mineral Trips Diary

Horace W. Slocum of Rochester, N. H., is one of our valued members. He is a mineral collector, too, and though we have never seen his collection we are very sure it must contain some mighty good specimens. At any rate he is a fine fellow and always has some interesting news relative to minerals acquired or localities visited.

Some few days ago when he called at our office and we were privileged to examine some of his recent acquisitions, including a large number of topographical maps, he nonchalantly called our attention to his mineral trips diary. At first we glanced through it hurriedly. Then we turned the pages over slowly. Finally we sat down and began to read. The diary simply fascinated us—it was so interesting and informative. We had never seen anything like it before. Its contents may be briefly summed up as follows:

Whenever Mr. Slocum visits a mineral locality, he writes up a brief report on the trip. The date, who went with him, locality visited, what was found, and any other items of interest are all recorded. A sketch map and at least one picture but often two, three or more of each locality, also appear with each report. All this makes the diary extremely interesting to a collector so it is no wonder that we were fascinated.

Here is a good suggestion for members in general and those who visit localities in particular. Keep a diary of your mineral trips and allow your friends to read it. This should not only stimulate your interest in collecting but it may start off some of your friends. Then, too, a diary should prove a very valuable source of reference on mineral localities.

New Mineral Holder

A simple but very effective mineral holder made of wire has recently been put on the market by John Grieger, 405 Ninita Parkway, Pasadena, Calif. The "Mineral Easel" is its name and it is so constructed that a wide range of various-shaped minerals may be displayed. The easel sells at 5c each.

New England Field Geologists

The Annual Fall Meeting of the New England Field Geologists will be held Oct. 14 and 15, 1938. Geological field trips under the leadership of Dr. Geo. W. Bain of Amherst College will be special features.

Complete outline of the Meeting will be mailed early in October. Those who may be interested in attending are requested to make reservations at their earliest with the Secretary, Dr. Lloyd W. Fisher, Dept. of Geology, Bates College, Lewiston, Maine.

Peter Zodac

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The Official Journal of the ROCKS and MINERALS ASSOCIATION

WHOLE NO. 86

COLLECTING MINERALS IN SOUTHWESTERN OHIO

By HERMAN WUESTNER

I have been living in Cincinnati, Ohio, for half a century and have been collecting minerals for that length of time but it was not until the latter part of 1936, when Mr. E. A. Sarles, a Chemical Engineer, came to see me, bringing with him a number of nice mineral specimens which he had collected within 60 to 80 miles of Cincinnati, that I learned attractive mineral specimens occurred in this area. Although only a few of these would make fine cabinet specimens, others proved interesting enough from a mineralogical or geological standpoint to be worthy of possession and description. I know Mr. Sarles was the first one to recognize most of the minerals found. This is true also of the vivianite and blue-iron earth to be mentioned further on. As he offered to take me to the different localities, we made Locust Grove, Ohio, 80 miles east of Cincinnati, our first objective. We continued east from Locust Grove for a short distance on Route 73, turned off on the first road on the left and continued on it for a distance of 4 miles from the last named place to where a bluff extended out far enough to cause the road to make a bend around the eastern part of it. There we found the best specimens. The bluff consisted of black shale, mostly in thin layers, resembling black slate, and again in thicker layers. Seams of calcite were present and occasionally a thin seam of gypsum. The shale had been quarried back for some distance for use as road material but a bench about 10 feet high was left standing, forming a loading platform for trucks. (Locality 13.)

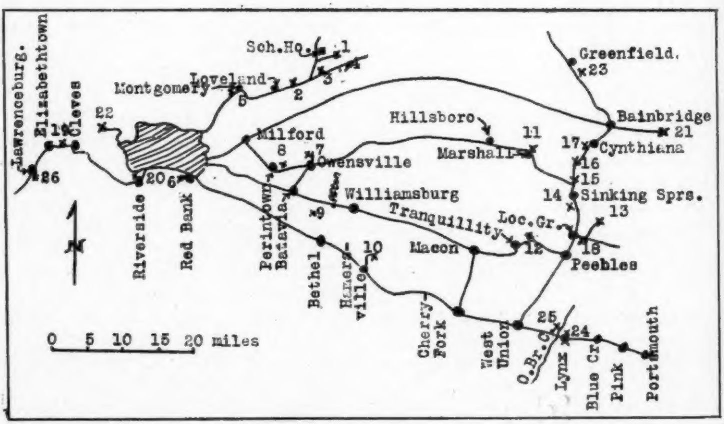
While the upper part of the quarry consisted chiefly of the shale, the lower part contained nodules of dolomite and limestone which having proved very hard and troublesome in quarrying, may have been another reason why this bench was left standing. The nodules varied in size from a few inches to 2 feet or more in diameter. Some were solid while others were hollow, forming geodes, and these geodes when broken open furnished fine mineral specimens. The outer part of the nodules, which varied in thickness from 1 to 2 inches, and was inclosed by the black shale, would consist of either a fine granular glistening dolomite or, if a limestone, a coarse crystalline calc spar. The dolomite nodule would be lined with pearl spar of a light yellow color, often sprinkled with marcasite which would in a short time alter to limonite and thus give the dolomite crystals a brown appearance. Some of the dolomite crystals would also be coated with asphaltum and even with small doubly terminated crystals of dog tooth spar. The calcite nodules, however, would furnish the best specimens. Their linings would consist of calcite crystals showing innumerable faces of parallel growth of several types, most of which were coated with a thin film of asphaltum and if held in a certain direction to the light would show a fine iridescence; these in turn were often covered by pearl spar, by round, black, shining globules of a hard asphaltum, and by doubly terminated clear crystals of quartz. The quartz crystals varied in

size from those just visible to the naked eye to ¼ of an inch in length. They were, however, of uniform size in the same geode. Very transparent small cleavage masses of barite were also found upon the calcite. Barite was also noted in broken shale which was found near the face of the bench. The barite was perfectly transparent but generally in small pieces although some reached several inches in length and half an inch in thickness; one side of the mineral being usually much honeycombed by erosion. The clearest barite contained numerous small inclusions which I am sure were marcasite.

Marcasite was also found in small concretions varying from perfectly fresh material to yellow ocher. The most interesting specimens were some crusts about ½ inch thick which showed a fine, fibrous structure and a color from deep yellow at the inner part to bronze and velvet brown at the outside.

At a certain horizon, a layer of coal covers a thin seam of shale, which of course is not true coal but seems to be carbonized plant matter. The coal is about the thickness of a knife blade and from what I can learn from geologists who have examined the formation, little is known about the plant which produced it. I have one piece of shale which shows that the vegetation must have been a leaf or flattened stem, 1½ inches wide and 8 inches long; another is larger than a man's hand and shows a heavy out branching stem which is now marcasite—the small branches being coal. I hope to get more information on these coal plants in the near future and if successful I will describe them in **Rocks and Minerals.**

As this was our first visit to the quarry and we had nothing but mineral hammers and chisels with us, it was impossible for us to extract the large nodules which were left in the bench that formed the floor and so we had to depend on the fragments of the geodes which lay scattered all around and which did however furnish us with some such



Map of Southwestern Ohio. Hatched area is Cincinnati.

Legend:
1. Vivianite and clay.
2. Conglomerate.
3. Vivianite & conglomerate.
4. Blue iron earth.
5. Forest ground.
6. Vegetable mold.
7. Gold.
8. Diamond.
9. Gold workings.
10. Vivianite & forest ground.
11. Forest ground.
12. Clinton ore.
13. Dolomite, calcite, coal, etc.
14. Clinton ore.
15, 16, 17, 18. Marl.
19, 20. Vegetable mold.
21. Alum & melanterite.
22. Manganese.
23. Rucker quarry.
24. Mexican onyx .
25. Glauconite.
26. Forest ground.

Localities 5, 6, 11, 19, 20, 26 are obliterated. 5 and 11 are wells; 6, 19 and 20 are worked out gravel deposits; and 26 is at a low water level, 2 feet, where the locality has a 9 foot stage.

fine specimens that we intended revisiting the quarry armed with heavy sledge hammers. This we did several months later just before winter set in. But to our surprise, the whole bench had disappeared, which of course was a keen disappointment. However, we are looking forward to the day when the upper part of the quarry will be worked down again to the geodiferous formation. Nevertheless we did find one large nodule, several feet in diameter. Apparently too much for the quarrymen to handle, it had been rolled to one side, across the road and out of the way. We set to on it with our sledges and after much laborious work cracked it open but to our disappointment it was solid calcite. Mr. Sarles later found a very symmetrical calcite concretion about 6 inches in diameter covered with a ¼ inch crust of marcasite. We found some marcasite nodules also and I further picked up the finest carbonized plant to be found on our two visits.

Marl and Other Minerals

Most of the minerals or rocks which I am to describe have been mentioned in the report of the Ohio Geological Survey of 1870. It was to satisfy our curiosity that we visited a number of the localities.

Between Locust Grove and Cynthiana, for a distance of about 15 miles, a rather porous rock, locally called "marl", has been quarried at several places for road metal. One quarry is located a short distance southeast of Locust Grove on Route 73 (Locality 18); another at the junction of Routes 41 and 124, one mile above Sinking Springs (Locality 15); several other small quarries are on the left side of the road, north of that place. The rock, belonging to the Helderberg Limestone formation, crumbles easily into a granular material. Chemically, it is a dolomite and in places it forms a dolomitic limestone. It is usually stained with asphaltum which also occupies fossil cavities in small drops. The rock contains numerous fossil remains but practically no perfect specimens. In the last two quarries on the east side of the road (Localities 16 and 17), going toward Cynthiana, are found a number of the cavities in the rock occupied by nests of innumerable small tabular crystals—too small to identify. According to the above named geological report, the marl, which looks like chalk in some quarries, crumbles readily, causing the carbonate of lime or magnesia, to leach out easily, leaving a gritty material which readily consolidates and for that reason is desirable as a road material. It is also claimed that the lime and magnesia, together with about 1½% of calcinic phosphate, after leaching, would act as a fertilizer.

We also visited Copperas Mountain, mentioned by Dana in his **System of Mineralogy**, Sixth Edition, p. 1085, as a few miles east of Bainbridge. The distance may be correct but as a bridge over Paint Creek had been washed out prior to our visit, we had to go over a mountain a distance of about 8 miles and from the other side of it, had to walk about a mile across fields to get to that part of the mountain that we wanted to see. One side of the mountain showed a vertical cliff about 300 feet high of thinly, stratified shale. The shales as far up as we could see were covered with melanterite and an alum, probably halotrichite. While these two minerals could not be collected from a point higher than a man could reach (unless he had a long ladder), it could be gathered in abundance. At the bottom of the cliff lay a block of comparatively light compact oil shale of a very uniform chocolate-brown color with some patches of clear gypsum. The block was about two feet thick and no doubt a part of a strata from the upper part of the cliff. If a piece of this shale is held in the flame of a gas jet, it is ignited and burns with a yellowish-red flame, giving off a bituminous odor. The color of the flame is due to small amounts of gypsum present, producing the reddish color. When first broken from the large block, an odor of crude petroleum is given off. The lateral length of the cliff is about 1,000 feet or more. Paint Creek, a considerable stream, runs parallel with its face

and a narrow road is between them. This is not a safe place to be in a rainy season or when the frost leaves the ground, as pieces of shale are dropping down constantly and one has but little chance to get out of their way. It is difficult to determine what is present at the upper part of the cliff as one can only look up but cannot step back to view it from a distance unless taken too far away. Dana records for this locality, alum, barite, calcite, copperas, and pyrite. (Dana's System, p. 1085.) (Locality 21.)

From here we went to the abandoned stone quarry of the Rucker Stone Co. (Locality 23) at Greenfield where we found marcasite and pyrite in small quantities. Also a number of concretions, some calcite, chert, but the most important, sphalerite. The sphalerite is usually associated with quartz and the concave part of the rock from which the nodules come is often lined with minute, clear, doubly terminated crystals of quartz with small pieces of light yellow sphalerite. As a geological curiosity, we found several short columns about 3-4 inches in diameter which dropped out of the rock when quarried. These occur in the upper layers at a certain level where they are somewhat abundant. They show grooves similar to stylolites and are probably made by pressure like the latter. They leave cylindrical holes in the rock and resemble the plugs punched out of a thick plate of metal. The rock varies in composition from dolomite to dolomitic limestone.

Asphaltum is found in nearly all rocks in the territory mentioned. In porous limestone or dolomite, or where fossil remains occur, asphaltum occurs as small drops or as small masses or as a coating. Some of the Greenfield stone is so saturated with it that if a specimen is put in a cabinet it is soon covered with a tarry substance and remains always soft. This type of asphaltum is the variety "mountain tar". At Locust Grove, asphaltum is found in hard shining balls up to ½ inch in diameter and remains so at ordinary temperatures. It is probably true asphaltum. Another kind is found at Greenfield, often forming a bluish black coating on the sphalerite or nodules which gives them a brown, shining streak resembling wax, and it may be the variety "earthwax".

West Union is 11 miles south of Locust Grove, and 77 miles east of Cincinnati. If we take Route 125 from here in a southeast direction, we pass through Lynx, 9 miles away, and a short distance beyond we find a vertical vein of Mexican onyx about 9 inches thick, partly solid and banded, but where the crevice is not completely filled up, it has a stalactitic or mammillary structure, and is more or less fluorescent. (Locality 24.)

A short distance further on, is Ohio Brush Creek. Following it north for one mile, we come to a strata of limestone, about two feet thick, much silicified in spots. It is more or less impregnated with glauconite, which in some parts takes up one-half of the rock while in other parts the granules are scattered sparingly through it. (Locality 25.)

Oolitic Hematite

Dana, in his Sixth Edition of **The System of Mineralogy** mentions hematite as occuring at Sinking Springs, Ohio, (p. 1085). U. S. Geological Survey Bulletin No. 624, **Useful Minerals of the United States** (1917), states that hematite (fossil ore) at Sinking Springs is the most important deposit in the state (p. 240). A bulletin of the Ohio Geological Survey of 1870 states "A true oolitic Clinton ore is found on the land of Nimrod Conway, near Sinking Springs" (p. 267).

Sometime ago, Mr. Sarles and I, on a visit to Sinking Springs, had inquired of all the real old residents of the community about the ore but not one of them had even heard of it. At that time I had not seen the item in the Ohio Geological Survey Report of 1870 which gave the name of the owner of the land on which the deposit occurred.

During the summer of 1937, a party of three, Mr. Sarles, Mr. Frank P. Atkins, Jr., and I, made another visit to the area. We left early one morning determined to find the occurrence, al-

though we knew it would be of little importance from a collector's standpoint but if once relocated it would save another collector from going on a wild goose chase for specimens after reading Dana's System or the Government report as we had done.

About 75 miles east of Cincinnati, about midway between Tranquility and Peebles, are found several brown rocks jutting out from the bank on the left side of the road. (Locality 12.) We found them to be the flax-seed variety of oolitic hematite thickly disseminated through the Clinton limestone. Impure ore of this kind, which is of no commercial value, has been reported from several localities in this vicinity. The flattened oolites have a brown color, give a yellow streak, and are altered to limonite. They are enclosed by a very thin shell resembling the hull of some grain. If, in breaking the hand specimen, the hull of the oolite could remain, it would be dull brown in color; but if the hull was pulled off, the former would be shining and show a bronze-like luster. These flattened oolites, scattered through the white matrix, chiefly calcite, make nice cabinet specimens. After collecting all we wanted, we journeyed on to Locust Grove. As we were now only 6 miles from Sinking Springs, we stopped in a General Store which was crowded with farmers (it was a Saturday afternoon) thinking it would be a good opportunity to get some information on our objective. No one in the Store knew anything about iron ore in the vicinity but an old gentlemen, with a white flowing beard who was sitting on the porch in front of the Store and who had heard our questions, came in and said: "I know the place you are looking for. It is on the old Nimrod Conway's farm. I can show you the hole the ore came out of, as my father showed it to me, but, remember, not one pound of ore was ever taken out during my time and I am 84 years old."

We were delighted with this information and hastily assured him of our desire to see the hole. He very kindly guided us to the locality. About half way between Locust Grove and Sinking Springs, we turned left off the road onto a lane which we traveled for about ¼ mile. Here we stopped the car and proceeded to walk up a hill. Near the top of this hill we found the place where the ore had been excavated, at two different places. At these excavations there was a heavy overburden of deep red granular soil which, when crushed with a knife blade, does not show any grit and seems to be a red ocher, the decomposition product of hematite. (Locality 14.)

On the way back, following an old wagon trail, we found several large lumps of limonite that were very porous, whose cellular structure in places contained small rounded cavities. These lumps looked very much like altered oolite but no well preserved oolitic structure could be noted. I do not know if hematite could alter to limonits in about 100 years and lose its original structure completely during that length of time. However, I was not much disappointed in not finding the pure oolitic ore but I was satisfied to find out that there is not enough iron ore there to be of any commercial or mineralogical value. We could see the outcrop of the overlying limestone but the oolitic hematite seemed to lie at the deepest place and could not be found without much labor. No large amount of material could have been taken out of these two places at any time as the excavations were very small.

Gold

About the year 1905, I had occasion to examine a collection of minerals and among them found a phial containing a considerable amount of gold, of the placer type, that is in flattened grains. The owner of the gold told me that his father had collected it in the vicinity of Batavia, Ohio, before the Civil War. I could not understand how gold could occur in that vicinity so I asked a number of people living there about it. No one knew of any deposit of gold in that area but some did say that it could be picked up sparingly in gullies and small

runs after heavy rains.

About the year 1930, Mr. Frank Lukemire, a man very familiar with the locality, showed me a phial containing some small flakes of gold and said that if I would go with him he would show me where the gold had been mined. I agreed. We went about seven miles east of Batavia, near Williamsburg, turned south for about a mile and got into a country cut up by deep gullies, with knolls about 30-40 feet high consisting of glacial boulder clay of a gray color and very hard. Into one of these knolls a tunnel had been driven a long time ago; the rotten timbers still visible at the entrance, the tunnel itself having caved in. (See Locality 9.) From the amount of material on the dump, it could be seen that considerable work had been done. I learned that the man who drove the tunnel had been a California miner who claimed the "hard pan" of the occurrence was the same as that in California. The miner, I was also told, made a fortune out of his mine but had died without revealing where he hid his money. The fact is, however, that he may have died of starvation as there could not have been enough gold to make mining profitable.

Heavy rains washing down these knolls carry along a few grains of black sand and once in a while a flake of gold is washed with them. Where the water forms a miniature waterfall and a little pot hole, a few grains of the black sand plus a color of gold may be found.

During October, 1933, Mr. Lukemire showed me another phial containing a larger amount of gold and told me he had finally located its source and again I went with him. This time we went to Owensville, a small community 28 miles east of Cincinnati and 4 miles northeast of Batavia. About one mile north of Owensville, near Brushy Creek, I found a flat section of land about 7 acres in area and about 200 yards west of the road, down the creek, belonging to the farm of Mr. Robert Titus. Mr. Titus had planted potatoes on this terrace which contains about 6 feet of glacial material from the finest sand up to boulders a foot in diameter. Prior to my visit, a flood in the creek, caused by a cloudburst, had stripped the terrace of all good soil, potatoes included. This revealed to Mr. Titus some black sand and having heard that where there is black sand there is also gold, he panned the material during the month of April the following year and found gold (See Locality 7).

On this terrace a crude washer has since been erected while a gasoline engine pumps water from the creek, elevates the material, and turns three revolving pans. While I was there they put the machine in operation; about 1½ cubic yards of material was run through in about 90 minutes. The pans were then cleaned and the residue was found to consist of black sand, some garnet, and gold. I took the black sand home with me and had it assayed which showed it contained $1.34 worth of gold (old price) to 1½ cubic yard of material. The black sand consisted of 65% ilmenite and 35% magnetite. This gold is found in the outwash of the earlier Wisconsin drift and corresponds in every detail to similar deposits in Brown and Morgan Counties, Indiana.

While visiting the Morgan County, Indiana, deposits, some 25 years ago, I was told by men who worked the deposits, now and then, that the placers averaged about 75c in gold per cubic yard of material. The Indiana deposits are much larger than those in Ohio owing to the fact that the creeks in the Ohio drift area run through narrow channels, with the hills encroaching close to them, leaving no room for any terraces to form, and thus the debris from the outwash of this particular glacial drift were carried on. A ridge about a mile long and up to 500 feet or more in width was formed from it at Red Bank, at the eastern end of Cincinnati, but I have never tested its contents for gold.

As this deposit on Brushy Creek is small and no larger ones are in sight, the regular placer mining method cannot be used as all adjoining ground is

under cultivation. It will not be possible, therefore, to work the deposit profitably. I have been told that in the Indiana fields, farmers not doing anything out of season can make about a dollar a day panning for gold. I think this would also hold good in Ohio.

Diamonds

About ten diamonds have been found in the gold placers of Indiana, three of which I have personally seen. One of the diamonds, a good shaped octahedron, was in the State House in Indianapolis at the time of my visit and probably is still there. It is, as near as I can remember, of fairly good size but of no gem value as it is not clear. A diamond was also found some 30 years ago near Perintown, Ohio, (Locality 8), which is near the gold deposit of Owensville. I believe more diamonds could be found here if they were easier to recognize. I have not been able to get all particulars on this find made by Mr. Roy McVitee on the Taylor farm which he had rented. He received $125 for the diamond; the buyer resold it for $1,000. I saw the stone in the Duhme Jewelry Store in Cincinnati, between 25 and 30 years ago, but do not remember its size.

The Taylor farm is located on Sugar Camp Run, 2 miles up from where it enters the East Fork of the Little Miami River. A small run, hemmed in by hills on each side, runs through the property. Glacial boulders and boulder clay is here in abundance. It was in this run that the diamond was found, so I have been told. The diamond was found five miles, as the crow flies, from where the gold is found.

Vivianite

Near the town of Loveland, 20 miles northeast of Cincinnati, are a number of remnants of an old glacial outwash deposited in gullies and against the banks of creeks. The deposits contain vivianite, both the crystallized and earthy varieties, the latter being called "blue-iron earth".

If we cross the Miami River at Loveland and take the only road which leaves the town in a northeasterly direction, we find a creek on our left which soon crosses over to the right of the road. A short distance more brings us to a little bend in the creek. (Locality 2.) Near this bend we find a conglomerate which resembles pisolitic bauxite in appearance. On examining the conglomerate closely we find its rounded grains are not concretions but much decomposed glacial pebbles, so soft in fact that a fracture of the conglomerate goes right through the pebbles rather than around them. This place is hard to find at times as the bank is very steep while leaves and humus from the woody growth above keep covering the conglomerate.

A few hundred feet more we find a road branching off to the left, but we cross on a bridge to the right and near the abutment of the northwest end of the bridge (Locality 3) on the left bank of the creek, we find a similar conglomerate, with larger pebbles and often mixed with local rocks, mostly the Cincinnati blue limestone. The open spaces between the pebbles are lined with a thin coating of a mineral which gives a yellowish green streak and may be dufrenite but the coating is so thin that not enough material for an analysis can be obtained. Upon this coating rest small slender crystals of vivianite. The conglomerate forms a ledge about one foot thick and the vivianite, as lustrous, blue-black crystals, 1-8 to ¼" in size, are unequally distributed in streaks through this ledge.

A short distance up the creek from here, we find a steep clay bank of a dark gray color, also glacial. (Locality 4.) This clay is spotted with the lighter blue earthy variety of vivianite (blue-iron earth), which fills or replaces small roots or stems in the clay. Part of this clay bank grades into a conglomerate and in it the crystallized variety, dark blue in color, also appears.

Retracing our steps back to the road, which turned off at the bridge, and following the same about a mile to a school house, turning down a road to a little creek over which we cross on a bridge, we stop. We go down to the creek at the bridge and find a high clay

bank consisting of a greenish clay enclosing colorless, light green or blue crystals of vivianite. (Locality 1.) Part of this clay shows circular brown spots about ½" in diameter which contain several dark blue crystals of vivianite in its center, showing alteration of the same which eventually grades into a yellow ocher-like substance. In a deep, narrow gulley, some distance away, a loosely coherent conglomerate is found which also contains crystals of vivianite.

In all cases the vivianite is sparsely distributed through the mass and in the clay, mostly two or three little crystals only are found in a 1" piece of matrix. The clay and conglomerate, near the schoolhouse, contain fragments of shells of recent origin, indicating that both deposits have been transported from their original position at a more recent date. They are a mixture of local and glacial material. Where the clay is weathered to a brown color, the crystals of vivianite are a dark blue. In the fresh greenish clay, the vivianite is colorless or a faint green. We find decomposed vegetable matter in the clay which probably was carried along with the other material that formed the deposit and it is often replaced by blue-iron earth.

A Manganese Occurrence

In September, 1936, I was asked to examine a deposit containing manganese located a few miles northwest of Cincinnati, Ohio. To reach the occurrence we went 2 miles over North Bend Road, from Harrison Ave., turned left on Boomer Road which we followed for one-half mile and then turned right into a field. The ore occurs at the lower end of this field in lumps, some being too large for a man to lift, and consists of manganese and iron oxides with silica and alumina. These small masses were covered with a few inches of soil; the soil evidently covered them during the tilling of the field. The mineral seemed to follow a certain level or horizon around the field while numerous small particles of hardened hydrous manganese and iron oxides were scattered throughout the soil indicating where they still were underneath or had been decomposed. (Locality 22.)

Mr. Clifford Kern, who owned the farm, had been told by his father (now deceased) that the manganese masses were meteorites. It was to determine their true identity that I was asked to examine the deposit. Curiously enough, the lumps, when washed clean by rain and hardened by exposure to the atmosphere, were smooth, pitted, with a dark brown to black color so that they did resemble meteorites from a distance and could fool almost anyone until they were examined closely.

If a portion of the inner part of a mass is crushed with the peen of a hammer, the powder resembles umber. If the crushed substance is washed, the turpid water poured off and the process repeated, nothing remains but some clear, much rounded pebbles of quartz, the largest being about the size of the head of a small pin. Once in a while a small fragment of jasper and a larger pebble of quartz are found. When the hardened crust of the material is included in the washing process, fragments of manganese and iron oxides remain and they resemble those found scattered over the surface. The masses have an earthy appearance when broken, of a dull yellow to brown to black color, and rarely are any of the small quartz pebbles to be seen; the masses apparently are a bog ore deposit. The pebbles seem to make the masses a conglomerate as no concretionary form can be observed.

The country rocks of the area are blue limestone and shale which practically contain no manganese so that the rounded masses must be of glacial origin. If so, how could they have been deposited by a glacial outwash, all in one place, and only a short distance away from the highest point in the area. 900 feet above sea level, when 930 feet is the highest point in the County? At Hamersville, Ohio, about 45 miles southeast from here, pellets of the same nature are scattered over the surface of tilled fields but no large masses have

been observed. This deposit on the Kern farm puzzles me greatly and I would like to hear from anyone who has observed similar deposits elsewhere.

Forest Ground and Blue-Iron Earth

While the forest ground is not a mineral or a rock, but only a silt impregnated with plant remains, it is closely connected with the earthy form of vivianite found in southwestern Ohio. Dr. Edward Orton found it on the bank of the Ohio River at Lawrenceburg, Indiana, also at Germantown, Ohio, and elsewhere. He called the deposit the Forest beds because of the tree stumps embedded in them. (Locality 26.) The Geological Survey of Ohio of 1870 mentions them and states that in the small town of Marshall, Highland County, Ohio, out of twenty wells dug, eleven of them penetrated this soil and that the water of some of them was so contaminated with this vegetable mold that it could not be used. (Locality 11.) It was also found in a well at Montgomery, Ohio, at a depth of 20 feet. (Locality 5.)

This ground is mostly found on the higher levels rather than in the valleys and as it lays from 10 to 90 feet below the present surface of the ground, the average being from 20 to 30 feet, it is therefore met with only when a well is sunk. Outcrops are rarely visible. The forest ground usually rests on blue clay which turns yellow on exposure to the atmosphere. No doubt there had been an intermission during the glacial period, the last deposit being the blue clay. The country had warmed up so vegetation, including cedars, beach, and other woody plants grew, driving their roots into the clay and producing enough vegetation to form this forest ground with the fine silt which seemed to have washed through the bed either while forming or it may have been the forerunner of the coming invasion which covered same with loam, clay, sand or gravel to the above mentioned depth. Whether the blue clay was the end of the Illinoian drift and the forest ground the beginning of the Wisconsin, has not been definitely established.

The blue-earth, or amorphous form of vivianite, having the color of Prussian blue, is soft, and soils the fingers. It occurs at the contact of the forest ground with the clay. Whenever small lumps of the former are embedded in the latter, the blue-iron earth is formed and the stems, twiggs, little rootlets, also long leafs resembling those of the pine, have often been replaced by vivianite. A faint mark about two inches long which seems to be a needle from a pine tree shows one-half blue-iron earth, the other half the brown color left by carbonized vegetation. Small round balls are also found which may be berries from cedars as they have been mentioned by botanists as occurring in the forest ground. Strange as it may seem, blue-iron earth is only found when the junction of the two beds is at the water-level of a creek.

White spots occur in the clay and when the wet clay is dug up, it turns blue on drying out and remains this color. Some of the small stems when broken across show a radiated crystalline structure, being crystalline vivianite. As stated above, outcrops of the two layers are rare and both of them are not always present, one or the other may be missing. It can readily be seen that if no blue clay was deposited, no vegetation could have grown on the rock, scoured clean by the glaciers. The forest ground differs in appearance from a dark silt, to true peat, and in a dried sample of several kinds I found from 22% to 38% of combustible matter, the latter making it almost an impure **lignite.**

The forest ground and blue-iron earth are found about 4 miles northeast of Hamersville on Miranda Run (Locality 10), a good mile above its junction with White Oak Creek. Hamersville is about 40 miles southeast of Cincinnati.

Some 40 years ago, a number of large glacial gravel deposits could be found in the vicinity of Cincinnati. In one, between Cleves and Elizabethtown (Locality 19), I noticed a black mark about 40 feet from the bottom up, and 20 feet from the top down. The mark,

about 2 inches wide, contained a dark brown light floculent powder which would burn. Under the same horizon, at Riverside, Cincinnati (Locality 20), I found the same, although 15 miles apart, and at Red Bank (Locality 6), on the opposite side of Cincinnati about 10 miles distant from the former, another mold was found. Here the pebbles were coated with a greasy black substance. If these interceptions indicated in these deposits are related to the forest ground, it has not yet been definitely proved. (These black layers were in a perfect horizontal position through all the deposits.) The deposits have all been removed for their gravel content by now.

There is no record to show that any blue-iron earth has been found in any of the wells where the clay and forest ground was reached. It seems that only where they are exposed and altered that the mineral is found. I do not think the forest ground is essential to form vivianite. The vegetable matter after decomposition loses in volume and thus forms channels for the ferrous phosphate solution to penetrate the clay which otherwise would be difficult and consequently assists greatly in the forming of this mineral.

I am taking this opportunity to thank Mr. E. A. Sarles, Chemical Engineer of Norwood, Ohio, for calling my attention to these deposits and for taking me to those localities where vivianite occurs. He still is searching for new localities and bringing me specimens. As far as I know, he was the first to find vivianite in southwest Ohio.

AN ONYX MARBLE QUARRY NEAR PLATTEVILLE, WISCONSIN

In June, 1937, Baney & Muller of Platteville, Wisc., opened up a new quarry about 6 miles southwest of the city. The quarry is located in Section 6, Town of Smelser, Grant County. It is near the top of a large hill, ¼ mile north of a hard surfaced road which begins 2½ miles to the west off County Trunk Highway D, at a point 4½ miles south of Platteville.

The rock of the deposit is chiefly onyx marble, in flat bedded, thin to thick layers which vary in color from dark chocolate to colorless; the colorless being at the bottom. So far not enough of the overlying material has been removed to thoroughly expose the colorless bed.

The quarry is about 40 feet long, 70 feet wide and 15 feet deep. No work has been done to excavate more material since January, but an exploratory drift has been driven into the hill to determine if the deposit continued. Not only did the onyx continue, but what was of more importance its quality was even better.

Although Mr. Frank E. Baney, one of the partners, has prospected throughout Wisconsin for many years, the deposit of his quarry is the only occurrence of onyx marble, to his knowledge, to occur in the state. Furthermore, he knew of its existence for many years but it was not until last year that he was able to lease the property.

A large stock of the onyx marble ranging in size from small slabs up to masses weighing 1,000 lbs. or more, have been quarried and are awaiting orders for shipment. The material takes a beautiful polish and often shows exquisite designs. It can be used for the making of novelties, ornaments, and interior decorations.

Small amounts of galena and a very highly colored clay occur in the quarry.

ROCKS AND MINERALS OF KANSAS

By A. C. CARPENTER
Ottawa, Kansas

Kansas is especially noted for its fossils. It has good collecting from the lower beds of the Pennsylvanian on up to the world renowned chalk beds of the Cretaceous, and also a number of good Pliocene and Pleistocene bone beds. We hear very little of the minerals of Kansas so I will attempt to tell about some of these.

The most plentiful and best known minerals and especially crystals come from the Mississippian formation in the Tri-State territory in the southeastern corner which laps over into Missouri and Oklahoma. In the mines here, we find galena in cubes and occasionally in octahedrons, sphalerite in several different shades, calamine, pyrite, marcasite, greenockite a cadmium sulphide, chalcopyrite in small but beautiful three-sided pyramids, calcite in fine large six-sided pyramids, and dolomite incrustations with curved faces.

At Baxter Springs is a mill for crushing Tripolite, commonly called Tripoli, a polishing powder. This material is what is called a transposed chert. It is mined near Seneca, Missouri, and shipped to Baxter Springs for processing. The Barnsdall Refining Company have a plant and mine near Seneca, Missouri.

Going north to Pleasanton, we find a mill grinding up an asphaltic limestone and an asphaltic sandstone to make road surfacing. This is one of the very few places in the United States that a limestone is so thoroughly impregnated with asphalt that it can be used this way.

The only native granite in Kansas is found along U. S. Highway No. 75, ½ mile north of a schoolhouse that is 8½ miles south of Yates Center. The road ditches have cut into some of this granite porphyry dike but more of it is exposed in the field just southwest. One interesting thing about this granite is that the quartz in it has taken on a bluish cast. Some druse, or rock crystal incrustation, is found in small cavities.

Four miles west and 2 south of the above mentioned school house is the Silver City dome in the Lawrence sandstone. Here quartzite of many beautiful colors can be found on the dumps of the many pits that were dug in 1879 in vain attempts to find silver. The only amethyst ever found in Kansas came from here. Prof. B. F. Mudge says he found some beautiful ones but I have found only a very few small ones. The following minerals have been reported from here in small quantities: epidote, hornblende, zircon, apatite, magnetite, sericite, kaolin, and chlorite.

There are three interesting old volcanic necks in Riley County. One is one mile east of the little town of Bala, south of the highway and just north of the railroad. It is a low, grass-covered mound about 30 feet high and is composed of a dark green peridotite and serpentine. This rock is very similar to that in the real diamond mine at Murfreesboro, Arkansas, but no one has yet found any diamonds in the Kansas outcrop. We hope you will be more successful but don't spend much money on the search for there is very little chance of finding any. The second one is in NE¼ of SE¼ of Sec. 23, T. 8 S., R. 6 E., which is 4 miles west and 2½ miles north of Stockdale. Prof. Arthur Sperry of the Geology Department at Manhattan has studied these rocks and finds them now largely serpentine and containing numerous black crystals of ilmenite up to one-half inch in diameter, phlogopite mica, and a few red spinels up to one-fourth inch in diameter, but none of these have good crystal boundaries. The third outcrop is in NW¼ of Sec. 22, T. 8 S., R. 5 E., or about 3 miles east and 3 north of the first one near Bala. Prof. Sperry says it is very similar to the second one.

At least a third of the counties of Kansas contain commercial deposits of volcanic ash or pumice, and a number of these are now being worked. Cudahy

Packing Company make "Old Dutch Cleanser" from ash out of Meade County. They ship the ash from there to Chicago, where they clean it, add 2% soap powder, and make that excellent cleaner called "Old Dutch Cleanser." Their advertisements say this is made of "Seismotite" which is a highsounding but very proper name for volcanic ash.

Bentonite is found in a number of places in Kansas. This is chemically altered volcanic ash that fell in an ocean and something in the salt water broke down the particle into a peculiar clay that will swell to several times its original size when dampened. It is used in rotary drilling mud and in filtering oils. The thickest known deposit of this is in NE¼ of Sec. 35, T. 1 S., R. 20 W., Phillips County.

One of the geological mysteries, as to its formation, is cone-in-cone. At three different places I have found some very interesting and peculiar cone-in-cones. The most peculiar ones come from SW¼ of NW¼ of Sec. 5, T. 33 S., R. 16 E., about 2½ miles southeast of Independence or about one mile south of the Portland Cement plant. The W. P. A. workers have recently quarried out a lot of the Drum limestone in the roadway just east of a bridge across a small stream and in the great pile of rock, as well as in place in the upper part of this road cut, we find numerous specimens of cones inside of each other all pointing up. Some of these are as much as one and one-half inches across the base but most of them are much smaller. The angle at the top is about 75°. All other cone-in-cone material that I have seen has the cones alternate up and down but in this one they all point up and are crowded closely together.

Three miles southwest of Americus, in Lyon County, near the water's edge under the highway bridge over the Neosho River in the Aspinwall limestone, is found a cone-in-cone layer from one inch to three inches thick that shows long slender cones pointing both up and down. The angle on these cones will average about 15°.

Four miles southeast of Kanopolis in Ellsworth County in the gravel bars along the Smoky Hill River can be found pieces of a larger cone-in-cone. These were evidently formed around some large concretions but it is hard to find them in place. These are often mistaken for petrified wood.

Kansas has produced the most beautiful and perfect selenite (gypsum) crystals I have ever seen. Most of the good ones are rather small, one-half to one and one-fourth inches long, but I have one nearly perfect specimen that is four and one-half inches long. It was found in the bluff along the Smoky Hill River, 4 miles southeast of Kanopolis where the river flows directly south. Many smaller specimens can be found in a road cut, one-fourth mile south of a filling station in the west edge of Brookville in Ellsworth County. Undoubtedly these can be found at other places in the base of the Dakota group and in the Graneros shale. The writer would like to hear of such other localities where they are plentiful.

At a great many places through central Kansas can be found massive beds of gypsum in the Permian. It is now mined at Sun City in Barber County, burned for plaster at Medicine Lodge, and is mined and burned near Blue Rapids in Marshall County. Most of this is coarse-grained white or gray, but I have seen some pieces that would make fair alabaster. I know of no place in Kansas where this is polished but there are possibilities along this line.

In the northeastern corner of Wallace County are several Pliocene deposits of a very light, fragile, snow-white diatomaceous marl that has possibilities for insulating material or as a source of hydraulic lime. After treatment with hydrochloric acid, the silicious tests of diatoms in this marl make a very interesting microscopic study.

Moss opal, erroneously called moss agate in some of the Kansas Geological reports, is found in several places in the Ogallala formation in Wallace County. This material is a milky white, common opal containing inclusions of black dentrite probably manganite and is found

along a side road at the top of the hill 5 miles south of Wallace, also in NW¼, Sec. 11, T. 15 S., R. 38 W., near the tops of the slopes. North of Morrill in Brown County is found a red celestite, in a ravine on the north side of the road 4 miles north and ½ mile west of Morrill.

Many interesting concretions are found in many parts of Kansas. The largest ones are the septarian concretions found in the dark shales of the Carlile and Pierre. At McAllaster Buttes in the northwest part of Logan County, the Pierre shale concretions contain good crystals of barite. In the same shales are others containing large ammonites and other shells. In the Lawrence formation, especially near Ottawa, are found hollow limonite concretions partly filled with clay. In the Champion Fossils beds south of Belvidere are ones containing sand and fossilized charcoal. In the black fissile shale of the Iola formation and of the Oread are small ones containing many unidentifiable and rare fossils such as fish bones, teeth, and the unbelievable casts of fish brains, also shells of the very rare Conularids and barnicles. Bones are seldom found in concretions, but as they are so plentiful in these, some geologists think they may be coprolites or petrified excrement.

A great bed of rock salt underlies all of Central and Southwestern Kansas. There are mines at Kanopolis, Hutchinson and Lyons. One of the interesting curios in geology are salt crystals containing a drop of water and a very small bubble of air; some of these are nature made levels. This water and air have been imprisoned in the salt crystal for two hundred million years. A rare, red salt is found in the mines of the American Salt Corporation at Lyons, Kansas. This beautiful red color is thought to be caused by iron oxide probably in a colloidal state.

The writer will be glad to hear from any one especially interested in any of these things in Kansas and to hear of localities where other specimens can be found.

Tectites, A Geological Mystery

An exhibit of tectites—representatives of one of the greatest of geological mysteries—has been placed on view at Field Museum of Natural History, it was announced recently.

Tectites, according to Henry W. Nichols, Chief Curator of Geology, are nodules and fragments of natural glass the origin of which is completely unexplained. No one knows where they come from, although many geologists have concluded that, like meteorites, they are of extra-terrestrial origin. No one knows by what process in nature they are made. They are scattered abundantly over certain limited areas of the earth's surface, notably in such widely separated places as Czechoslovakia, Indio-China, Australia and neighboring islands, the Dutch East Indies, the Philippines, the Ivory Coast of Africa, and the Libyan Desert.

"Tectites are siliceous glass much like the volcanic glass, obsidian," says Mr. Nichols. "They show indications of having been melted, and their shapes indicate that they were cooled while whirling in the air. Peculiar etched patterns appear on their surfaces, presenting another puzzling feature which scientists have been unable to interpret. Most tectites are black, but some from Moravia in Czechoslovakia and from the Libyan Desert are clear enough to be cut into gems.

"Many igneous theories have been propounded to account for tectites, but there seem to be insuperable objections to all of them. Even to the meteoritic origin ascribed by some geologists there are objections fully as grave as those adduced against a terestrial source."

PHILADELPHIA ACADEMY OF NATURAL SCIENCES INSTALLS NEW FLUORESCENT EXHIBIT

On April 25, 1938—ten years after it had presented the first exhibit of fluorescent minerals in this country, the Academy of Natural Sciences of Philadelphia opened a new, enhanced, exhibit. Minerals are shown under both long and short wavelengths of ultraviolet radiation.

The installation is the first completely "robot" exhibit in a museum. It is set in operation by a visitor passing a pair of (direciotnal) photoelectric cells. The mechanical "brain", synchronized with the recording (the script is published below), causes the exhibit to go thru a four minute cycle: first, electric lights to show the mineral under ordinary illumination; then the lights dim out, and at the cue "the invisible becomes visible" the minerals are shown fluorescing. The arcs are later extinguished so that phosphorescence is shown, and finally the electric lights are automatically snapped on.

SCRIPT OF RECORDING ON

FLUORESCENT MINERALS

By SAMUEL G. GORDON

"You are about to see the remarkable phenomenon of FLUORESCENCE, so called because it is so strikingly shown by the mineral FLUORITE.

"To understand what is happening, let me remind you of the nature of LIGHT. Much of our knowledge regarding light we owe to Sir Isaac Newton, born in 1650. He let the sun's rays fall upon a triangular glass prism, thru a hole in a shutter, into a dark room. The white light was broken up into red, orange, yellow, green, blue, indigo, and violet. With another prism he recombined these colors and got white light. In other words, the sun sends us rays of various sorts, which mixed together, give the effect of white light. Newton called his little "rainbow" the spectrum, bordered by red at one end and violet at the other.

"It is obvious that if a mineral looks red, it is because it selects the red rays from the white light to reflect back to you; if the mineral is blue, it is the blue rays that are reflected.

"For more than a century after Newton there was still just the distinction: Light, and Darkness—the absence of light. Then in 1800 Sir William Herschel discovered that out in the darkness there were other rays which the limitations of man's eyes had failed to reveal. He repeated Newton's experiment, breaking up the sun's rays into the spectrum. Placing a thermometer in the darkness beyond the red band he was amazed to find that it got warmer than when placed in the color bands. He realized that the sun sent forth rays beyond red light which the eyes could not detect. These are the infra-red rays.

"The next year the discovery was made that there were other rays beyond the violet end of the spectrum, also invisible to humans. These are called the ultraviolet rays. Most objects when placed in the path of ultraviolet rays are invisible. In 1852, Sir George Stokes discovered that some substances, when placed in these rays, instead of being invisible, glow! The invisible becomes visible.

"The ultraviolet rays in this exhibit are being produced by two carbon-arc health lamps, supplemented by quartz mercury-vapor lamps. Glass screens of remarkable composition filter out the visible rays, permitting only the invisible ultraviolet rays to pass thru.

"Stokes' discovery was remarkable in another respect. Since the time of Newton, the primary spectrum was considered as something fixed. The idea of changing light of one color into another—say blue light into red light, was no more thought of than the possibility of transmuting copper into silver among serious chemists. Yet here were rays of one kind —invisible ultraviolet rays, being changed to visible hues: blue, green, red, and so on.

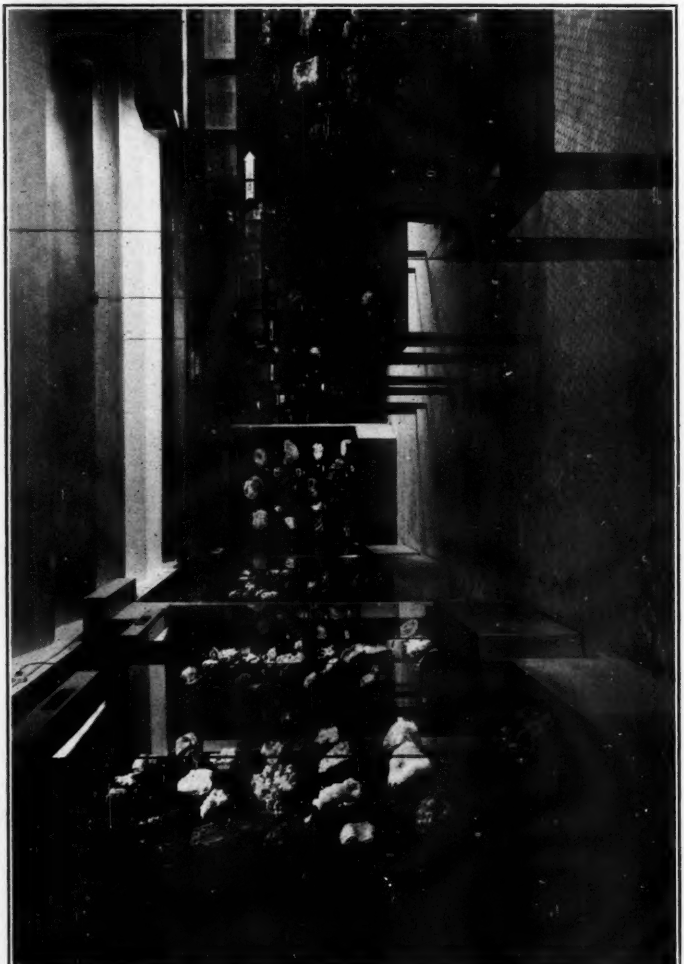
"Technically: energy in the form of short wavelengths of ultraviolet rays vibrating rapidly are converted by the minerals into rays of light of longer wavelength vibrating slowly enough to be visible to the eye.

"What happens in the case of those minerals which do not fluoresce? Ultraviolet rays strking such substances are reflected back as ultraviolet rays. While these reflected rays cannot be seen, they will affect a photographic plate, but you must use a camera with a quartz lens.

"That is the distinction between reflection and fluorescence: in the one case ultraviolet rays are reflected back as invisible rays; in fluorescence, the rays are converted into visible light.

"Of the more than 40,000 minerals

Entrance to the new Mineral Hall of the Academy of Natural Sciences of Philadelphia. Educational "layouts" prepare the visitor for the collection of crystals and that of the minerals in the section beyond.



A view in the Mineral Hall showing the new cases designed by Mr. Samuel G. Gordon. These are essentially "glass envelopes" and have no wood or metal frames. The black velveteen backgrounds, individual mounting of specimens upon supports of glass, labels of silver lettering on clear plastocele, and plastic lighting give the effect of a grotto.

examined in the Academy's mineralogical laboratory, only these few show the phenomena so strikingly. Not all specimens of even the same mineral react, however. Those that fluoresce contain something, some impurity, that activates them. Willemite and calcite from Franklin, New Jersey, contain small amounts of manganese as activators. Too much manganese inhibits them.

"Needless to say fluorescent properties have become an invaluable aid in identifying many substances. Fluorescent screens are used in X-ray work, and television would be impractical without them.

"Many minerals continue to glow after the ultraviolet radiation has ceased; this afterglow is known as phosphorescence."

TWO MINERAL LOCALITIES IN NEW MEXICO

By TOM TARR

Early in June of 1937, plans which I had made for a mineral tour of eight days duration, matured. Leaving Bartlesville, Okla., in the morning, via bus, I reached Tucumcari, New Mexico, the next morning. Travelling on to Santa Rosa, the bus was detained about six hours by washed out bridges and gullies full of water. The twenty-three passengers had the novel experience of having to get out and wade through water, push the bus through mud holes, and walk across two bridges where the bus was forced to cross on heavy timbers. In spite of all this we arrived in Albuquerque that night.

Next morning, I caught a bus to New Laguna, almost fifty miles west of the highway through Albuquerque, to the agate deposit which was described in the special agate number of "Rocks and Minerals" (Sept.-Oct. 1936) by G. B. Ellermeier. I forgot Mr. Ellermeier's description, however, and got off the bus half-way between the small towns of New Laguna and old Laguna. Striking south from the highway, I traveled down a creek bed picking up far more agates than I was able to carry back. They were mostly blue-gray and dark translucent pieces with several streaks of crimson running through and rarely a fair piece of carnelian. Some chunks weighted as much as twenty pounds or more while the average was probably two or three pounds. I also found an agate arrowhead, several broken pieces of ancient Indian pottery, and back under a bluff of granitic rocks were a number of groups of partially buried, sharpened, painted, smooth sticks a foot long and with feathers tied to the bundles. Possibly some of our ethnologically minded friends can explain them, I can't. The land around me was an Indian reservation. I met one Indian who told me with vague gestures that his sons had picked up garnets in some ant-hills about "eleven-ten miles" to the north. Looking over some ant-hills, all that I could find in them were countless perfect quartz crystals about a millimeter in length.

Leaving the Lagunas, I went back to Albuquerque, then south to Socorro, and west again to Magdalena. From Magdalena I shouldered my pack to the mountains south of there to the heart of the old Magdalena mining district, around Kelly. Several miles northeast of Kelly, I examined the old mines there and picked up many fine specimens of pyrite, cerussite, specularite, and bornite. Some of the pyrite specimens were large crumbly, glittering masses composed of pyrite cubes about two millimeters in size. Several were showy little groups adorned with lacy white crystals of cerussite. The bornite was very beautiful in the sun, occurring as round patches surrounded by specularite. Trudging over the mountains I came upon the well known Kelly mine. There, by high-grading the ore bins and combing the waste rock piles, I picked up a nice selection of beautiful green botryoidal and crystalline smithsonite for which this district is famous. The bins had mostly galena and sphalerite in them. The day became cloudy and it was surprisingly hard to distinguish between minerals. Being a collector in the Joplin District for the last ten years, I never thought I'd see the day when I'd have to look twice to identify galena or sphalerite but there in the massive forms I had to check their hardness several times before I could recognize them. Other minerals found were chalcopyrite, a little malachite and azurite, groups of light brown quartz crystals and some calcite. A large number of minerals from Kelly have been described by Wuestner[1].

While I was there, considerable interest was shown in a report of wire gold being found in seams intruding into a

1 Wuestner, Herman, **A Check List of Minerals from Kelly, New Mexico.** ROCKS and MINERALS, Dec. 1930, p. 127.

Pennsylvania limestone on a mountian a few miles from Kelly. Several told of seeing specimens which would not only be interesting to a mineral collector but would be worth a fair amount of good hard cash to anyone. After leaving the Kelly mine I was given a ride by a Mr. Kenneth Hughes. By one of those amazing sort of coincidences, he was the operator of the Kelly mine and the brother of a friend of mine in Bartlesville. He was a typically bronzed and hospitable westerner and he told me many interesting facts about the mine and surrounding country. He gave me three fine specimens of the green smithsonite which I really appreciated. The largest weighs three-fourths of a pound and would be excellent for gem material. (Aside to the cynics—none of three are for sale).

From Mr. Hughes I found that the surrounding magnificent scenery and mountains were as wild as they looked, harboring deer, bear, and mountain lions and antelope on the prairie nearby. I heartily recommend the Magdalena, New Mexico, district as a worth while collecting area to the vacationist within range.

PRIZE ARTICLE CONTEST

In the June issue of **Rocks and Minerals** we announced that two generous members of the Rocks and Minerals Association have contributed $50 to be divided into three prizes for a good, better, and best article on some mineralogical subject. The first prize will be $25, the second $15, and the third $10.

The rules of the contest are:

Articles must deal with some mineralogical subject with emphasis on popular appeal and general interest yet with some scientific aspect included. For instance, if a locality is described, something of the occurrence as well as a description of the minerals present should be treated. Photos, maps, etc. are not necessary but could serve to make an article more interesting. These should be in shape for publication. All maps, drawing and sketches should be in black ink.

Articles must be typewritten (keep a carbon copy for your files) from 4,000 to 6,000 words in length, and as each will be judged anonymously, the author's name should not appear on it. Have two title pages for each article. On the first type the name of the article and your name and address; on the second title page type only the name of the article. All articles must be submitted by or before midnight of October 15, 1938.

Address them to

PRIZE ARTICLE CONTEST,
ROCKS and MINERALS,
PEEKSKILL, N. Y.

All entrants must be members of the Rocks and Minerals Association.

No article will be returned (if not a prize winner) unless a self-addressed stamped envelope is enclosed with it. Furthermore all articles submitted in the contest will be held subject for possible publication in **Rocks and Minerals.**

The judges in the contest are: Dr. Frederick H. Pough of the American Museum of Natural History, O. Ivan Lee, and Arthur Montgomery, all of New York City.

The prize-winning articles will be announced in the January, 1939, issue of **Rock and Minerals** and published in the early issues of that year.

Other than that the articles should be addressed to **Rocks and Minerals,** this magazine has nothing to do with the running of the contest. All such mail as is addressed to the Prize Article Contest will be turned over to the judges.

BIBLIOGRAPHICAL NOTES

Quartz Family Minerals

During the past few years there has been such a keen interest manifested in quartz minerals as agate, chalcedony, jasper, rock crystal, that a book on these popular minerals was urgently needed. **Quartz Family Minerals,** just off the press, adequately fills this need.

Quartz Family Minerals is intensely interesting. It is well written, has many fine illustrations, but above all it has been prepared by three eminent mineralogists who are well schooled in the subjects upon which they have written. Dr. H. C. Dake is Editor of **The Mineralogist** of Portland, Oregon; Mr. Frank L. Fleener is Head of the Geology Department of Joliet Township Junior High School, Joliet, Ill.; and Mr. Ben Hur Wilson is assistant to Mr. Fleener.

The book contains fifteen chapters arranged as follows:

Chapter 1. Why know quartz?
Chapter 2. The historical lore of quartz.
Chapter 3. The way to quartz.
Chapter 4. The matter of crystallization.
Chapter 5. The quartz crystal.
Chapter 6. The crystalline forms of quartz.
Chapter 7. The massive forms of quartz.
Chapter 8. The intermediary forms of quartz.
Chapter 9. The cryptocrystalline and amorphous forms of quartz.
Chapter 10. Agate-chalcedony.
Chapter 11. Geodes and thunder eggs.
Chapter 12. Unusual quartz types.
Chapter 13. The opal.
Chapter 14. Silification and petrified forests.
Chapter 15. The art of cutting quartz gems.

Quartz Family Minerals is a book to be recommended to anyone and should be in the library of every collector and mineralogist. It contains 304 pages, 52 illustrations. Price $2.50. Published by McGraw-Hill Book Co., Inc., New York City.

—P. Z.

MINERAL TABLES for the determination of minerals by their physical properties. By Arthur S. Eakle, Late Professor of Mineralogy, University of California. Third Edition, revised by Adolf Pabst, Associate Professor of Mineralogy, University of California.

In the years since 1911, when the Eakles Tables were first issued, it has been well demonstrated that the arrangement of minerals primarily by their streak, color and hardness, gives the student the surest and quickest means of identifying minerals.

The Third Edition contains descriptions of about 200 minerals, including the common ones and others that are rarer, some of them of local interest.

Pages 1-7 are devoted to the physical properties of minerals: color, luster, streak, hardness, specific gravity, crystallization, cleavage, parting, fracture, tenacity, and structure.

Pages 10-16 contain tables of minerals having a dark gray or black streak.

Page 16 contains table of minerals having a white to lead or steel-gray streak.

Pages 18-22 contain tables of minerals having a red or red-brown streak.

Pages 22-26 contain tables of minerals having a yellow or yellow-brown streak.

Pages 26-28 contain tables of minerals having a blue or green streak.

Pages 28-63 contain tables of minerals having uncolored streaks.

Eakles-Pabst **Mineral Tables** will prove very popular especially with those collectors who have no means of identifying their specimens by chemical analysis. The book contains 73 pages, is cloth bound, sells for $1.50, and is published by John Wiley & Sons, Inc., 440 4th Ave., New York, N. Y.

(Continued on page 280)

THE AMATEUR LAPIDARY

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

THE ART OF THE LAPIDARY
Part 2.

The preparation of the diamond powder for charging the slicer is described under the head DIAMOND; but it may be added that the usual criterion for the fineness of the diamond powder used by lapidaries is, that the particles should be so small that no sparkling is perceptible when the diamond powder is exposed to the light.

Slight differences are made in the forms of mortars for crushing diamonds, but that represented in Fig. 2. is the more generally preferred. The mortar **a**, has a deep cylindrical hole terminating at the bottom in a spherical cavity of hardened steel, embracing from about one-third to one-sixth of a circie, into which the pestle **b**, is accurately fitted by grinding. The long cylindrical fitting serves as a guide for keeping he pestle upright, and also prevents any of the valuable particles from flying about when the pestle is struck with the hammer; the cover **c**, is also added for the latter purpose. In some mortars for crushing diamonds, the bottom of the cavity is made flat, and the pestle is then made square at the end, as shown in Fig. 3., in which **a** represents the base of the mortar, **b** a short cylindrical tube fitted into a shallow cavity in the base, and **c** the pestle, which is fitted within the tube. But this form of mortar is seldom employed by working lapidaries.

Sometimes, when the diamond has not been crushed sufficiently fine in the mortar, the lapidaries grind the diamond powder; for this purpose they commonly mix it with a little olive oil or the oil of brick, and spread it upon a flat piece of iron, generally an old laundry iron, and any small piece of iron is used as a muller. The mortar represented in Fig. 4. is, however, greatly preferable for grinding the diamond powder. The base **a** of the mortar has a spherical cavity, of hardened steel and about two inchs radius, to which is fitted the pestle **b**, which is also made of hardened steel and fixed in a wooden handle. The diamond powder is placed in the centre of the cavity, and a few drops of oil are added; the diamond is then ground as fine as required, by rubbing the pestle within the mortar with moderate pressure.

In applying the diamond powder to a new slicer, or as it is called seasoning the slicer, it is mounted in the machine, and the edge is turned quite true and smooth, with a graver supported upon the rest **h**, Fig. 1. or in some cases it is afterwards smoothed with a fine file, as it is of importance that the edge of the

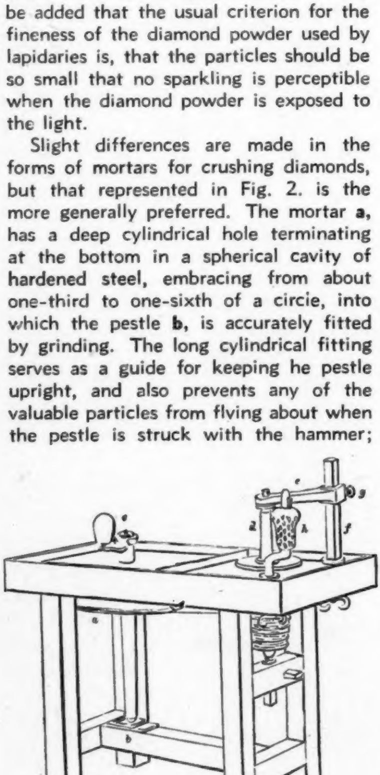


Fig. 1.

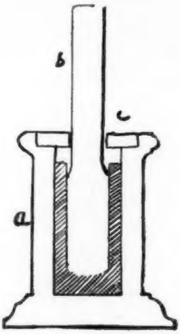


Fig. 2

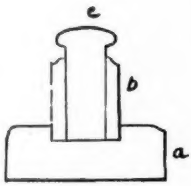


Fig. 3

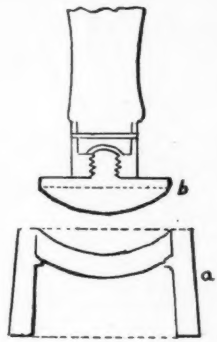


Fig. 4

slicer should be quite true, and free from even minute notches, or otherwise the irregularities would be liable to catch the stone, and throw it out of the hand, or if the stone were firmly held, the slicer would become distorted.

A small quantity of diamond powder, mixed with the oil of brick, is then taken out of the cup with a small piece of stick, or a better practice is to employ a piece of an ordinary quill about one inch long, prepared by splitting the barrel of a quill lengthwise into three or four pieces, and rounding the ends.

The quill is dipped in the cup, and a little of the diamond powder, or rather paste, is taken on the concave side of the quill, which is then held vertically against the edge of the slicer, so that the curvature of the slicer may nearly agree with that of the quill; the latter is then held steady while the slicer is moved slowly round, in order to distribute the diamond uniformly on the extreme edge of the slicer. To fix the particles therein, a smooth piece of any hard stone, such as agate or flint, from half an inch to an inch wide, is immediately applied with gentle pressure against the edge of the slicer.

In order that both hands may be at liberty for charging the slicer, the wheel is sometimes turned by an assistant, and the lapidary supplies the diamond powder with one hand while he holds the charging-stone to the edge of the slicer with the other. As soon as the diamond begins to cut the stone, the latter is shifted to another position, as, if the slicer were permitted to cut a groove in the charging-stone, the diamond powder would become fixed in the sides of the slicer, which must of course be avoided. As soon as the small quantity of diamond resting on the edge of the slicer has been pressed into it, the margin of the slicer is carefully wiped on both sides with the forefinger, in order to remove any small portions of the diamond that may have become accidentally lodged on the sides, and these particles are pushed to the edge of the slicer, and pressed in with the charging-stone. When the whole of the diamond-powder has been pressed in to the extreme edge, a second quantity is applied in the same manner, and which is generally sufficient for charging or seasoning a new slicer. After the edge of the slicer has been once fairly charged with the diamond powder, a single application is generally sufficient for restoring the cutting edge, and under the hands of the practical lapidary, a single seasoning will endure several hours' work.

Mineralogical Club of Hartford Visits A Marble Quarry In Vermont

On June 19th, through the courtesy of Mr. Mortimer R. Proctor of the Vermont Marble Company of Proctor, Vermont, the Mineralogical Club of Hartford was invited to visit the Company's Quarry at West Rutland, Vt. Members met at the quarry at 11 o'clock a. m. Under the guidance of Mr. C. L. Montgomery, Supt., they were escorted to the bottom of the pit (which incidently is 285 feet deep), through the maze of tracks, cables, machines and through tunnels which extended far back under the mountain to the point where operations were then going on. All along the way, Mr. Montgomery explained the methods and operations used in getting out the huge blocks of marble which weigh on the average twenty tons each; also pointing out the many colors in the stone and stating that about 75 kinds of marble (trade names) were obtained from the West Rutland Quarry.

An old fault was noted in the wall of the pit which had been filled with tar to keep out the water. The temperature in the pit and tunnels was about 30° F. A huge mound of ice was to be seen in the center of one tunnel which was approximately 8 feet in diameter and 8 or 9 feet high. Huge masses of ice were also seen hanging from the walls. Other than these ice masses, very little seepage was noted. The ceilings of the tunnels where work was in progress were from 140' to 190' in height; the tunnels varied from 75' to 150' in width.

After coming out of the workings, we were shown the storage yard where thousands of tons of marble were stored and again the various colorings were pointed out. Many of the large or famous buildings and memorials in this country were built of marble quarried and finished by the Vermont Marble Co. (i.e. Radio City and Grand Central Station in New York City, many of the State Capitols, Supreme Court buildings and the Tomb of the Unknown Soldier at Arlington, Virginia).

At this point some of the members left for home while others drove over to Proctor, Vt. to visit the Marble Exhibit of the Company which is said to be largest in the world. Here we were shown the finished products in all their beauty and many uses from lamp shades which were translucent and of many colors to a complete church Altar. The intricacies of cutting, polishing and matching to get the many beautiful designs were minutely explained by the guides. This exibit has been open only 4 years but it has become a place of much interest. Last year they entertained 37,000 visitors. After extending our grateful thanks to Mr. M. R. Proctor and to Mr. C. L. Montgomery for the many courtesies extended us, we left for home.

BIBLIOGRAPHICAL NOTES

(Continued from page 277)

A Report on the Geology of the Patapsco State Park of Maryland: by L. Bryant Mather, Jr., Asst. Curator, Department of Mineralogy, Natural History Society of Maryland.

The Patapsco State Park lying just west of the city of Baltimore and adjacent to the main highways to the west is a very well known area to Baltimoreans. Geological it lies in the Fall Lime Zone at the edge of the Piedmont region at the locus of several varieties of igneous intrusions. Consequently the mineralogy of this park area is of no little popular as well as scientific interest.

The report consists of 33 pages, including a 9-page mineral check list, and 1 map.

Issued by The Natural History Society of Maryland, 2103 Bolton St., Baltimore, Maryland.